

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-T-1	34103 CHWCGNJT 115 34109 CHWCGN 115 1	Base Case	P0	Basecase	<100%	101.82	99.68	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-2	34276 ADAMS_E TP 70.0 34271 WSTLDJCT 70.0 1	Base Case	P0	Basecase	107.31	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Congestion management/SPS
Fresno-T-3	34115 AVENAL T 70.0 34117 KETLMN T 70.0 1	Base Case	P0	Basecase	101.93	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Congestion management/Reconductor
Fresno-T-4	34159 PANOCHEJ 115 34160 HAMMONDS 115 1	P1-2:A13:118:_Panoche - Mendota 115 kV Line	P1	Single Contingency	<100%	100.22	100.03	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-5	30805 BORDEN 230 30810 GREGG 230 2	P2-3:A13:12:_NON-BUS-TIE BREAKER CB322 FAULT AT 30805 BORDEN 230.00	P2	Single Contingency	104.43	94.63	92.30	N/A	N/A	N/A	N/A	N/A	HELMS RAS Model will mitigate the overload
Fresno-T-6	34112 EXCHEQUR 115 34116 LE GRAND 115 1	P2-2:A13:20:_BUS FAULT AT 34144 MERCED 115.00	P2	Single Contingency	114.07	105.40	102.09	N/A	N/A	N/A	N/A	N/A	Short term rating/ Upgrade/expand SPS
Fresno-T-7	34144 MERCED 115 34146 MERCED M 115 2	P2-2:A13:17:_BUS FAULT AT 34116 LE GRAND 115.00	P2	Single Contingency	155.36	137.93	133.57	N/A	N/A	N/A	N/A	N/A	Exchequer SPS will mitigate the overload (Loss of Legrand-Exchequer 115 kV line)
Fresno-T-8	34159 PANOCHEJ 115 34160 HAMMONDS 115 1	P2-3:A13:36:_NON-BUS-TIE BREAKER CB1322 FAULT AT 30465 MENDOTA 115.00	P2	Single Contingency	98.56	115.91	120.86	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-9	34160 HAMMONDS 115 34161 DFSTP 115 1	P2-1:A13:176:_PANOCHE1-PANOCHE1 #1 115 kV	P2	Single Contingency	<100%	102.74	107.08	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-T-10	34161 DFSTP 115 34162 ORO LOMA 115 1	P2-1:A13:176:_PANOCHE1-PANOCHE1 #1 115 kV	P2	Single Contingency	<100%	100.37	104.68	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-T-11	34200 ORO LOMA 70.0 34162 ORO LOMA 115 2	P2-4:A13:12:_BUS-TIE BREAKER 202 FAULT AT PANOCHE 115.00	P2	Single Contingency	99.72	133.38	137.66	N/A	N/A	N/A	N/A	N/A	Upgrade the T/F/ Explore possible SPS Options.

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					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-T-12	34200 ORO LOMA 70.0 34222 MRCYSPRS 70.0 1	P2-4:A13:12:_BUS-TIE BREAKER 202 FAULT AT PANOCH 115.00	P2	Single Contingency	92.58	117.69	121.85	N/A	N/A	N/A	N/A	N/A	Upgrade the T/F/ Explore possible SPS Options.
Fresno-T-13	34202 MERCED 70.0 34230 MRCDFLLS 70.0 1	P2-2:A13:17:_BUS FAULT AT 34116 LE GRAND 115.00	P2	Single Contingency	141.74	149.20	143.39	N/A	N/A	N/A	N/A	N/A	Exchequer SPS will mitigate the overload (Loss of Legrand-Exchequer 115 kV line)
Fresno-T-14	34252 MADERA 70.0 34256 BORDEN 70.0 2	P2-2:A13:29:_BUS D FAULT AT 34256 BORDEN 70.00	P2	Single Contingency	114.51	116.64	122.08	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-15	34321 MCSWAINJ 70.0 34230 MRCDFLLS 70.0 1	P2-2:A13:17:_BUS FAULT AT 34116 LE GRAND 115.00	P2	Single Contingency	158.15	164.18	159.17	N/A	N/A	N/A	N/A	N/A	Exchequer SPS will mitigate the overload (Loss of Legrand-Exchequer 115 kV line)
Fresno-T-16	34321 MCSWAINJ 70.0 34232 EXCHEQUR 70.0 1	P2-2:A13:17:_BUS FAULT AT 34116 LE GRAND 115.00	P2	Single Contingency	191.59	193.67	187.00	N/A	N/A	N/A	N/A	N/A	Exchequer SPS will mitigate the overload (Loss of Legrand-Exchequer 115 kV line)
Fresno-T-17	34359 AIRWAYJ2 115 34408 BARTON 115 1	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	233.51	NConv	NConv	N/A	N/A	N/A	N/A	N/A	Split the bus further/Reconductor/SPS
Fresno-T-18	34366 SANGER 115 34359 AIRWAYJ2 115 1	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	247.97	NConv	NConv	N/A	N/A	N/A	N/A	N/A	Split the bus further/Reconductor/SPS
Fresno-T-19	34408 BARTON 115 34412 HERNDON 115 1	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	222.49	NConv	NConv	N/A	N/A	N/A	N/A	N/A	Split the bus further/Reconductor/SPS
Fresno-T-20	34409 PNDLJ2 115 34416 BULLARD 115 1	P2-1:A14:282:_HERNDON-PNDLJ1 #1 115 kV	P2	Single Contingency	<100%	140.27	151.82	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-21	34410 MANCHSTR 115 34412 HERNDON 115 1	P2-4:A14:7:_BUS-TIE BREAKER 202 FAULT AT 30875 MC CALL 230.00	P2	Single Contingency	91.09	103.73	102.84	N/A	N/A	N/A	N/A	N/A	Northern Fresno Area reinforcement mitigates future years.Explore operating solution/Transmission upgrades for sensitivity scenarios.
Fresno-T-22	34411 PNDLJ1 115 34416 BULLARD 115 1	P2-1:A14:281:_HERNDON-PNDLJ2 #1 115 kV	P2	Single Contingency	<100%	116.93	126.73	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-23	34418 KINGSBRG 115 34428 CONTADNA 115 1	P2-4:A14:7:_BUS-TIE BREAKER 202 FAULT AT 30875 MC CALL 230.00	P2	Single Contingency	91.32	108.60	106.96	N/A	N/A	N/A	N/A	N/A	Reduce GWF_HEP Generation
Fresno-T-24	34429 GWF_HEP 115 34428 CONTADNA 115 1	P2-4:A14:7:_BUS-TIE BREAKER 202 FAULT AT 30875 MC CALL 230.00	P2	Single Contingency	95.31	112.67	111.07	N/A	N/A	N/A	N/A	N/A	Reduce GWF_HEP Generation
Fresno-T-25	30805 BORDEN 230 30810 GREGG 230 1	P1-2:A13:79:_Warnerville - Wilson 230 kV Line and P1-2:A13:7:_ (New) Borden - Gregg #2 230 kV Line	P6	Multiple Contingency	125.08	121.19	121.22	N/A	N/A	N/A	N/A	N/A	HELMS RAS Model and propose modification as required

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Fresno-T-26	30805 BORDEN 230 30810 GREGG 230 1	P1-1:A13:9:_Q723 0.31 Generator ID 1 and P1-2:A13:5:_ (New) Borden - Gregg #2 230 kV Line	P3	Multiple Contingency	123.58	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Model Helms RAS and propose modification as required
Fresno-T-27	30805 BORDEN 230 30810 GREGG 230 2	P1-2:A13:88:_Borden - Gregg 230 kV Line and P1-2:A13:79:_Warnerville - Wilson 230 kV Line	P6	Multiple Contingency	101.27	100.05	99.97	N/A	N/A	N/A	N/A	N/A	HELMS RAS Model will mitigate the overload
Fresno-T-28	34105 CERTANJ1 115 34100 CHWCHLLA 115 1	P1-2:A14:8:_Northern Fresno (E2) - Kerchoff No. 2 115 kV Line and P1-2:A14:9:_Northern Fresno (E2) - Kerchoff No. 1 115 kV Line	P6	Multiple Contingency	<100%	<100%	101.01	N/A	N/A	N/A	N/A	N/A	Congestion Management/SPS(Kerchoff Gen)/setup
Fresno-T-29	34112 EXCHEQUR 115 34116 LE GRAND 115 1	P1-2:A13:84:_Panoche Energy Center 230 kV Tap and P1-3:A13:22:_Merced 115/70 kV Transformer No. 2	P6	Multiple Contingency	<100%	100.45	<100%	N/A	N/A	N/A	N/A	N/A	Short term rating/ Upgrade/expand SPSCongestion management(/Dec Exchequer Gen)
Fresno-T-30	34112 EXCHEQUR 115 34116 LE GRAND 115 1	P1-2:A14:161:_Coppermine-Friant 70 kV Line and P1-3:A13:22:_Merced 115/70 kV Transformer No. 2	P6	Multiple Contingency	<100%	99.92	100.01	N/A	N/A	N/A	N/A	N/A	Short term rating/ Upgrade/expand SPS / Congestion management(/Dec Exchequer Gen)
Fresno-T-31	34159 PANOCHEJ 115 34160 HAMMONDS 115 1	P1-2:A13:47:_Q644 115 kV Tap (Le Grand - Dairyland) and P1-2:A13:118:_Panoche - Mendota 115 kV Line	P6	Multiple Contingency	<100%	134.34	139.33	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-32	34160 HAMMONDS 115 34161 DFSTP 115 1	P1-2:A13:47:_Q644 115 kV Tap (Le Grand - Dairyland) and P1-2:A13:118:_Panoche - Mendota 115 kV Line	P6	Multiple Contingency	<100%	126.09	131.00	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-33	34200 ORO LOMA 70.0 34162 ORO LOMA 115 2	P1-2:A13:1:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:121:_Los Banos-Livingston Jct-Canal 70 kV Line	P6	Multiple Contingency	277.12	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Upgrade the T/F/ Explore possible SPS Options.
Fresno-T-34	34200 ORO LOMA 70.0 34162 ORO LOMA 115 2	P1-2:A13:119:_Panoche - Oro Loma 115 kV Line and P1-2:A13:118:_Panoche - Mendota 115 kV Line	P6	Multiple Contingency	<100%	105.58	103.00	N/A	N/A	N/A	N/A	N/A	Upgrade the T/F/ Explore possible SPS Options.

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					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-T-35	34200 ORO LOMA 70.0 34162 ORO LOMA 115 2	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:124:_Los Banos-Livingston Jct- Canal 70 kV Line	P6	Multiple Contingency	<100%	283.74	286.17	N/A	N/A	N/A	N/A	N/A	Upgrade the T/F/ Explore possible SPS Options.
Fresno-T-36	34200 ORO LOMA 70.0 34218 DOS PALS 70.0 1	P1-2:A13:1:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:121:_Los Banos-Livingston Jct- Canal 70 kV Line	P6	Multiple Contingency	357.72	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios.
Fresno-T-37	34200 ORO LOMA 70.0 34218 DOS PALS 70.0 1	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:124:_Los Banos-Livingston Jct- Canal 70 kV Line	P6	Multiple Contingency	<100%	365.66	369.40	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios.
Fresno-T-38	34206 CANAL 70.0 34212 LVNGSTNT 70.0 1	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:18:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota)	P6	Multiple Contingency	<100%	103.34	108.75	N/A	N/A	N/A	N/A	N/A	SPS/Summer Setup/Reconductor
Fresno-T-39	34206 CANAL 70.0 34216 SNTA RTA 70.0 1	P1-2:A13:1:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:121:_Los Banos-Livingston Jct- Canal 70 kV Line	P6	Multiple Contingency	296.75	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Case Diverged/ Explore Reactive support options
Fresno-T-40	34206 CANAL 70.0 34216 SNTA RTA 70.0 1	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:124:_Los Banos-Livingston Jct- Canal 70 kV Line	P6	Multiple Contingency	<100%	298.03	298.87	N/A	N/A	N/A	N/A	N/A	Case Diverged/ Explore Reactive support options
Fresno-T-41	34206 CANAL 70.0 34216 SNTA RTA 70.0 1	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:18:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota)	P6	Multiple Contingency	<100%	114.75	119.30	N/A	N/A	N/A	N/A	N/A	SPS/Summer Setup/Reconductor

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					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-T-42	34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1	P1-2:A13:1:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:16:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota)	P6	Multiple Contingency	109.75	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Evaluate possibility of a SPS/ propose summer setup
Fresno-T-43	34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:18:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota)	P6	Multiple Contingency	<100%	119.56	125.53	N/A	N/A	N/A	N/A	N/A	Evaluate possibility of a SPS/ propose summer setup
Fresno-T-44	34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1	P1-2:A13:1:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:16:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota)	P6	Multiple Contingency	110.69	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Evaluate possibility of a SPS/ propose summer setup
Fresno-T-45	34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1	P1-2:A13:18:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota) and P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL)	P6	Multiple Contingency	<100%	120.04	127.47	N/A	N/A	N/A	N/A	N/A	Evaluate possibility of a SPS/ propose summer setup
Fresno-T-46	34210 SNTA NLA 70.0 34212 LVNGSTNT 70.0 1	P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:18:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota)	P6	Multiple Contingency	<100%	106.05	111.59	N/A	N/A	N/A	N/A	N/A	Evaluate possibility of a SPS/ propose summer setup
Fresno-T-47	34216 SNTA RTA 70.0 34218 DOS PALS 70.0 1	P1-2:A13:1:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL) and P1-2:A13:121:_Los Banos-Livingston Jct- Canal 70 kV Line	P6	Multiple Contingency	306.77	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Case Diverged/ Explore Reactive support options
Fresno-T-48	34216 SNTA RTA 70.0 34218 DOS PALS 70.0 1	P1-2:A13:124:_Los Banos-Livingston Jct-Canal 70 kV Line and P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL)	P6	Multiple Contingency	<100%	308.29	311.34	N/A	N/A	N/A	N/A	N/A	Case Diverged/ Explore Reactive support options
Fresno-T-49	34237 CANANDGA 70.0 34255 TRIGO J 70.0 1	P1-2:A13:130:_Borden - Madera #1 70 kV Line and P1-2:A13:129:_Borden - Madera #2 70 kV Line	P6	Multiple Contingency	<100%	101.93	106.10	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS
Fresno-T-50	34240 GLASS 70.0 34237 CANANDGA 70.0 1	P1-2:A13:126:_Borden - Madera #2 70 kV Line and P1-2:A13:127:_Borden - Madera #1 70 kV Line	P6	Multiple Contingency	109.24	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS



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Fresno-T-51	34240 GLASS 70.0 34237 CANANDGA 70.0 1	P1-2:A13:129:_Borden - Madera #2 70 kV Line and P1-2:A13:130:_Borden - Madera #1 70 kV Line	P6	Multiple Contingency	<100%	111.58	115.88	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS
Fresno-T-52	34240 GLASS 70.0 34256 BORDEN 70.0 1	P1-2:A13:126:_Borden - Madera #2 70 kV Line and P1-2:A13:127:_Borden - Madera #1 70 kV Line	P6	Multiple Contingency	116.25	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS
Fresno-T-53	34240 GLASS 70.0 34256 BORDEN 70.0 1	P1-2:A13:129:_Borden - Madera #2 70 kV Line and P1-2:A13:130:_Borden - Madera #1 70 kV Line	P6	Multiple Contingency	<100%	117.90	123.61	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS
Fresno-T-54	34252 MADERA 70.0 34256 BORDEN 70.0 2	P1-2:A13:125:_Borden - Glass 70 kV Line and P1-2:A13:127:_Borden - Madera #1 70 kV Line	P6	Multiple Contingency	114.43	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-55	34252 MADERA 70.0 34256 BORDEN 70.0 2	P1-2:A13:128:_Borden - Glass 70 kV Line and P1-2:A13:130:_Borden - Madera #1 70 kV Line	P6	Multiple Contingency	<100%	116.00	121.51	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-56	34256 BORDEN 70.0 30805 BORDEN 230 1	P1-3:A13:9:_Borden 230/70 kV Transformer No. 2 and P1-3:A14:39:_Wishon 70/2.3 kV GSU	P6	Multiple Contingency	<100%	101.80	90.39	N/A	N/A	N/A	N/A	N/A	Congestion management
Fresno-T-57	34256 BORDEN 70.0 34252 MADERA 70.0 1	P1-2:A13:125:_Borden - Glass 70 kV Line and P1-2:A13:126:_Borden - Madera #2 70 kV Line	P6	Multiple Contingency	115.55	<100%	<100%	N/A	N/A	N/A	N/A	N/A	propose SPS/ Summer setup
Fresno-T-58	34256 BORDEN 70.0 34252 MADERA 70.0 1	P1-2:A13:129:_Borden - Madera #2 70 kV Line and P1-2:A13:128:_Borden - Glass 70 kV Line	P6	Multiple Contingency	<100%	117.16	122.79	N/A	N/A	N/A	N/A	N/A	propose SPS/ Summer setup
Fresno-T-59	34390 DANISHCM 115 34370 MC CALL 115 1	P1-2:A14:145:_California Ave.-Sanger 115 kV Line and P1-2:A14:147:_McCall-West Fresno 115 kV Line	P6	Multiple Contingency	108.95	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-60	34390 DANISHCM 115 34370 MC CALL 115 1	P1-2:A14:150:_McCall-West Fresno 115 kV Line and P1-2:A14:148:_California Ave.-Sanger 115 kV Line	P6	Multiple Contingency	<100%	120.84	132.22	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-61	34402 CAL AVE 115 34366 SANGER 115 1	P1-2:A14:143:_McCall-California Ave. 115 kV Line and P1-2:A14:147:_McCall-West Fresno 115 kV Line	P6	Multiple Contingency	103.73	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-62	34402 CAL AVE 115 34366 SANGER 115 1	P1-2:A14:146:_McCall-California Ave. 115 kV Line and P1-2:A14:150:_McCall-West Fresno 115 kV Line	P6	Multiple Contingency	<100%	111.67	118.15	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-63	34402 CAL AVE 115 34390 DANISHCM 115 1	P1-2:A14:145:_California Ave.-Sanger 115 kV Line and P1-2:A14:147:_McCall-West Fresno 115 kV Line	P6	Multiple Contingency	106.30	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-64	34402 CAL AVE 115 34390 DANISHCM 115 1	P1-2:A14:148:_California Ave.-Sanger 115 kV Line and P1-2:A14:150:_McCall-West Fresno 115 kV Line	P6	Multiple Contingency	<100%	118.02	129.22	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-T-65	34404 WST FRSO 115 34370 MC CALL 115 1	P1-2:A14:146: _McCall-California Ave. 115 kV Line and P1-2:A14:148: _California Ave.-Sanger 115 kV Line	P6	Multiple Contingency	<100%	107.77	115.49	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution
Fresno-T-66	34417 KINGS J2 115 34418 KINGSBRG 115 1	P1-2:A14:157: _GWF - Kingsburg 115 kV Line and P1-2:A14:156: _McCall - Kingsburg #2 115 kV Line	P6	Multiple Contingency	<100%	102.43	103.23	N/A	N/A	N/A	N/A	N/A	Congestion management/reconductor/SPS
Fresno-T-67	36354 SAN MIGL 70.0 34574 COLNGA 1 70.0 1	P1-3:A14:18: _Gates 230/70 kV Bank #5 and P1-2:A13:48: _Panoche - Schindler #2 115 kV Line (Q612 Tap)	P6	Multiple Contingency	121.21	114.23	101.89	N/A	N/A	N/A	N/A	N/A	Congestion management/reconductor/SPS
Fresno-T-68	34123 K1-JCT 115 34358 KERCKHF2 115 2	P1-2:A14:6: _Northern Fresno (E2) - Kerchoff No. 2 115 kV Line and P1-2:A14:7: _Northern Fresno (E2) - Kerchoff No. 1 115 kV Line	P6	Multiple Contingency	105.37	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Congestion management/ Back off Kerckhoff units as needed.
Fresno-T-69	34105 CERTANJ1 115 34100 CHWCHLLA 115 1	P7-1:A14:6: _Kerckhoff-Clovis-Sanger No. 1 & 2 115 kV Lines	P7	Multiple Contingency (common structure)	167.05	167.67	<100%	N/A	N/A	N/A	N/A	N/A	Congestion Management/SPS(Kerchoff Gen)/setup
Fresno-T-70	34105 CERTANJ1 115 34121 SHARON T 115 1	P7-1:A13:49: _(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	138.08	134.19	<100%	N/A	N/A	N/A	N/A	N/A	Congestion Management/SPS(Kerchoff Gen)/setup
Fresno-T-71	34121 SHARON T 115 34128 OAKH_JCT 115 1	P7-1:A13:49: _(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	141.66	137.81	<100%	N/A	N/A	N/A	N/A	N/A	Congestion Management/SPS(Kerchoff Gen)/setup
Fresno-T-72	34123 K1-JCT 115 34358 KERCKHF2 115 2	P7-1:A13:49: _(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	102.78	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Congestion Management/SPS(Kerchoff Gen)/setup
Fresno-T-73	34128 OAKH_JCT 115 34123 K1-JCT 115 1	P7-1:A13:49: _(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	102.78	<100%	<100%	N/A	N/A	N/A	N/A	N/A	Congestion Management/SPS(Kerchoff Gen)/setup
Fresno-T-74	34162 ORO LOMA 115 34168 EL NIDO 115 1	P7-1:A13:43: _(New) Borden-Gregg #1 & #2 230 kV Lines	P7	Multiple Contingency (common structure)	<100%	102.38	96.01	N/A	N/A	N/A	N/A	N/A	Reconductor/Remove limiting elemets, if any.
Fresno-T-75	34402 CAL AVE 115 34366 SANGER 115 1	P7-1:A14:12: _McCall-California Ave. & McCall-West Fresno 115 kV Lines	P7	Multiple Contingency (common structure)	103.44	111.71	118.16	N/A	N/A	N/A	N/A	N/A	Reconductor/SPS/Operating Solution

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-T-76	34998 E2_PGE 115 34997 E1_PGE 230 1	P7-1:A13:49:_(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	131.11	131.11	99.90	N/A	N/A	N/A	N/A	N/A	Model Helms RAS and propose modification as required
Fresno-T-77	34348 SHEPHERD 115 34998 E2_PGE 115 1	P7-1:A13:49:_(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	107.93	104.97	<100%	N/A	N/A	N/A	N/A	N/A	Model Helms RAS and propose modification as required
Fresno-T-78	34998 E2_PGE 115 34997 E1_PGE 230 2	P7-1:A13:49:_(New) Gregg-E1 #1 & #2 230 kV Line	P7	Multiple Contingency (common structure)	131.11	131.11	99.90	N/A	N/A	N/A	N/A	N/A	Model Helms RAS and propose modification as required

Study Area: **PG&E Greater Fresno Sensitivity**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %							Potential Mitigation Solutions	
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A		N/A
Fresno-VD-1	CERTANJ1 115 kV	P1-2:A13:99:_Le Grand - Chowchilla 115 kV Line	P1	Single Contingency	<5%	<5%	11.699	N/A	N/A	N/A	N/A	N/A	Modify Exchequer SPS/Explore reactive power support options (Exchequer 70 kV pocket)
Fresno-VD-2	CHWCHLLA 115 kV	P1-2:A13:99:_Le Grand - Chowchilla 115 kV Line	P1	Single Contingency	<5%	<5%	11.743	N/A	N/A	N/A	N/A	N/A	Modify Exchequer SPS/Explore reactive power support options (Exchequer 70 kV pocket)
Fresno-VD-3	GILLRAN 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	11.769	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-4	MADERAPR 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	11.479	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-5	MENDOTA 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	15.184	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-6	NEWHALL 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	10.52	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-7	PMTFMPP 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	11.75	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-8	PMTFMPPJT 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	11.75	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-9	Q607 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	15.185	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-VD-10	AIRWAYJ1 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	11.549	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-11	AIRWAYS 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	26.497	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-12	BARTON 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	32.844	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-13	BULLARD 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	78.37	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-14	CHWCHLLA 115 kV	P2-1:A13:136:_CHWCHLLA-CERTAN T #1 115 kV	P2	Single Contingency	<5%	<5%	11.731	N/A	N/A	N/A	N/A	N/A	Modify Exchequer SPS/Explore reactive power support options (Exchequer 70 kV pocket)
Fresno-VD-15	HERNDON 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	59.796	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-16	LASPALMS 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	11.556	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)

Study Area: **PG&E Greater Fresno Sensitivity**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %								Potential Mitigation Solutions
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-VD-17	MANCHSTR 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	12.922	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-18	PNEDLE 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	80.204	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-VD-19	SESWTF 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	26.475	<5%	<5%	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)

Study Area: **PG&E Greater Fresno Sensitivity**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-V-1	CERTANJ1 115 kV	P1-2:A13:99:_Le Grand - Chowchilla 115 kV Line	P1	Single Contingency	>0.9	>0.9	0.8974	N/A	N/A	N/A	N/A	N/A	Explore Reactive support options.
Fresno-V-2	CHWCHLLA 115 kV	P1-2:A13:99:_Le Grand - Chowchilla 115 kV Line	P1	Single Contingency	>0.9	>0.9	0.897	N/A	N/A	N/A	N/A	N/A	Explore Reactive support options.
Fresno-V-3	FRESNOWW 70 kV	P1-3:A14:13:_Kearney 230/70 kV Transformer No. 2	P1	Single Contingency	<1.10	1.1087	1.1077	N/A	N/A	N/A	N/A	N/A	Check T/F Taps (Kearney 70 kV pocket)
Fresno-V-4	GILLRAN 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	0.8768	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-V-5	KEARNEY 70 kV	P1-3:A14:13:_Kearney 230/70 kV Transformer No. 2	P1	Single Contingency	<1.10	1.109	1.1079	N/A	N/A	N/A	N/A	N/A	Check T/F Taps (Kearney 70 kV pocket)
Fresno-V-6	MADERAPR 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	0.8839	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-V-7	PMTFMPPJT 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	0.8783	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-V-8	Q607 115 kV	P1-2:A13:115:_Panoche - Mendota 115 kV Line	P1	Single Contingency	0.8603	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Oroloma 70 kV reinforcement proj mitigates future years.(Mercy Spring 230/70 kV bank). Explore operating solution/Transmission upgrades for sensitivity scenarios
Fresno-V-9	AIRWAYJ1 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.8953	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-10	AIRWAYS 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.7485	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-11	BARTON 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.6871	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-12	BULLARD 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.2285	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Case Diverged explore mitigation options
Fresno-V-13	CHWCHLLA 115 kV	P2-1:A13:136:_CHWCHLLA-CERTAN T #1 115 kV	P2	Single Contingency	>0.9	>0.9	0.897	N/A	N/A	N/A	N/A	N/A	Modify Exchequer SPS/Explore reactive power support options (Exchequer 70 kV pocket)
Fresno-V-14	FRESNOWW 70 kV	P2-3:A14:7:_NON-BUS-TIE BREAKER CB2322 FAULT AT 30830 KEARNEY 230.00	P2	Single Contingency	1.1116	1.1078	1.1065	N/A	N/A	N/A	N/A	N/A	Check T/F Taps (Kearney 70 kV pocket)
Fresno-V-15	HERNDON 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.4345	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-16	KEARNEY 70 kV	P2-3:A14:7:_NON-BUS-TIE BREAKER CB2322 FAULT AT 30830 KEARNEY 230.00	P2	Single Contingency	1.1118	1.1081	1.1066	N/A	N/A	N/A	N/A	N/A	Check T/F Taps (Kearney 70 kV pocket)
Fresno-V-17	LASPALMS 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.8952	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)

Study Area: **PG&E Greater Fresno Sensitivity**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2020 SP Heavy Renewable & Min Gas Gen	2025 Retirement of QF Generations	2025 SP No AAEE	N/A	N/A	N/A	N/A	N/A	
Fresno-V-18	MANCHSTR 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.8819	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-19	PNEDLE 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.2126	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-20	SESWTF 115 kV	P2-2:A14:37:_BUS 2 FAULT AT 34412 HERNDON 115.00	P2	Single Contingency	0.7494	>0.9	>0.9	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-21	CAL AVE 115 kV	P1-2:A14:146:_McCall-California Ave. 115 kV Line and P1-2:A14:148:_California Ave.-Sanger 115 kV Line	P2	Single Contingency	>0.9	0.8662	0.8521	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-22	CANAL 70 kV	P1-2:A13:124:_Los Banos-Livingston Jct-Canal 70 kV Line and P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL)	P2	Single Contingency	>0.9	0.1807	0.1737	N/A	N/A	N/A	N/A	N/A	Case Diverged explore mitigation options
Fresno-V-23	CHWCHLLA 115 kV	P1-1:A14:61:_KERCKHOF 13.80 Generator ID 1 and P1-2:A13:99:_Le Grand - Chowchilla 115 kV Line	P3	Multiple Contingency	>0.9	0.8806	0.8767	N/A	N/A	N/A	N/A	N/A	Explore Reactive support options.
Fresno-V-24	DAIRYLND 115 kV	P1-2:A13:47:_Q644 115 kV Tap (Le Grand - Dairyland) and P1-2:A13:118:_Panoche - Mendota 115 kV Line	P6	Multiple Contingency	>0.9	0.7277	0.713	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Exchequer/Legrand pocket)
Fresno-V-25	DANISHCM 115 kV	P1-2:A14:148:_California Ave.-Sanger 115 kV Line and P1-2:A14:150:_McCall-West Fresno 115 kV Line	P6	Multiple Contingency	>0.9	0.8123	0.785	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)
Fresno-V-26	DOS PALS 70 kV	P1-2:A13:18:_Oro Loma - Mendota 115 kV Line (Tomatak - Mendota) and P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL)	P6	Multiple Contingency	>0.9	0.788	0.7675	N/A	N/A	N/A	N/A	N/A	Explore Reactive support options.
Fresno-V-27	MARIPOS2 70 kV	P1-2:A13:113:_Wilson - Merced #2 115 kV Line and P1-2:A13:103:_Exchequer - Le Grand 115 kV Line	P6	Multiple Contingency	>0.9	>0.9	0.8976	N/A	N/A	N/A	N/A	N/A	Explore Reactive support options.
Fresno-V-28	SNTA RTA 70 kV	P1-2:A13:124:_Los Banos-Livingston Jct-Canal 70 kV Line and P1-2:A13:3:_Mercy Springs Sw Sta - Canal - Oro Loma 70 kV Line (MRCYSPRS - CANAL)	P6	Multiple Contingency	>0.9	0.5956	0.5902	N/A	N/A	N/A	N/A	N/A	Case Diverged explore mitigation options
Fresno-V-29	WST FRSO 115 kV	P1-2:A14:150:_McCall-West Fresno 115 kV Line and P1-2:A14:148:_California Ave.-Sanger 115 kV Line	P6	Multiple Contingency	>0.9	0.7879	0.7581	N/A	N/A	N/A	N/A	N/A	Provide additional reactive support (Herndon/Mccall 115 kV pocket)